Magnetically-Controlled Electroslag Melting (MEM) Of Multicomponent Titanium Alloys

Ya.Yu. Kompan, I.V. Protokovilov

The E. O. Paton Electric Welding Institute of NAS of Ukraine,

Technology of the magnetically-controlled electroslag melting of titanium alloys has been developed. This technology is peculiar by the use of external magnetic fields during melting. Thus, the directed electrovortical flows (EVF) or reciprocal oscillation (vibration) of the melt are created in a metal pool.

EVF level the pool temperature field, intensify heat and mass transfer in the metal pool, thus providing the formation of metal with a high chemical and physical homogeneity.

Vibration of the melt allows metal structure refining.

It is shown that superposition of external longitudinal magnetic field on the melting zone redistributes the hydrodynamic pressure on the metal pool surface and, thus, makes it possible to control the depth and shape of the metal pool.

Mechanical properties of a new class of titanium alloys with an intermetallic strengthening, produced by MEM method, are given.